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General Notes.

PETROGRAPHY.[1]

The Lherzolites of the Pyrenees and their Contact Action.—The contact action of the lherzolites of the Pyrenees upon the lower Jurassic rocks through which they cut has been studied carefully by Lacroix,[2] who publishes his conclusions in a volume illustrated by six plates containing fifty figures. The intensity of the metamorphism varies widely. At 500 meters from the contact the limestones are filled with metamorphic minerals, and even at 1.5 kilos from the nearest visible contact with the eruptive the limestomes still contain many of these. The altered sedimentary rocks are limestones, calcareous marls and occasionally sandstones. In the limestones the principal new minerals found are dipyr, micas, feldspars, tourmaline, rutile, sphene, magnetite, hematite, pyrite, apatite, quartz, graphite and rarely spinel, epidote and garnet. The calcareous marls have been changed to aggregates of silicates with four types of structure, the honestone, the micaceous schist and the amphibolitic and dioritic. Near the contact the organic coloring matter of the marls has disappeared. A little further away it is changed to graphite and at a greater distance it remains intact. The fissures cutting through the metamorphic rocks are lined with zeolites, which, however, the author does not think are connected in any way with the metamorphic processes. The sandstones, at the only contact seen, were changed into quartzites rich in needles of rutile, and a lusite, sillimanite and a few flakes of mica. A close similarity exists between the contact action of lherzolites and granites. The difference in the two cases consists in a corrosion of the metamorphic rocks by the granite and a great production of feldspar, while in the case of the lherzolites there is no transition between the metamorphosing and the metamorphosed rocks. The conditions determining the nature of the contact rock formed are: 1, the original composition of the sedimentary beds; 2, the quantity of the volatile and soluble substance accompanying the eruptive; and 3, the conditions under which the rock was erupted.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Comptes Rendus, Feb. 11, 1895. Nouv. Archiv. D'hist. Nat., III, Sér. vi, p. 209.

Nepheline Rocks from the Kola Peninsula.—A full account of the nepheline syenite region of the Kola Peninsula, Finland, by Ramsey[3] and Harkman has recently appeared. The main results of the senior author's study of the region have already been given in these notes. Other results can only be referred to, as they are two numerous to be described in detail. The authors define a new rock type—imandrite. It is a rock composed of quartz, plagioclase. chlorite, biotite and several accessory components. The first two minerals occur in isometric grains separated from each other by seams of chlorite or biotite. The rock has a half clastic structure, since the quartz and feldspar appear often as fragments in the interstitial chlorite. The quartz is largely secondary, and is supposed to be due to a silicification

[3] Fennia, 11, No. 2, 1894. Also American Naturalist, 1892, p. 334.

of the original rock. A second type of imandrite resembles a silicified porphyritic rock. A hypersthene-cordierite-hornfels, with handsome cordierite crystals, an oliving-actinolite schist, containing cordierite, and several contact metamorphosed sediments are described in detail. The major portion of the article deals with the nepheline syenites and the related rocks—theralites, augite,-porphyrites, iolites, monchiquites, tinguaites, etc., and the new rocks, lujavrite and tawaite. The theralite agrees exactly with Rosenbusch's definition of the type. It is a medium grained aggregate of idiomorphic pyroxene, and granitic plagioclase and nepheline, with the accessories brown hornblende, biotite, sphene, magnetite, apatite, sodalite and secondary zeolites. Lujavrite is a trachytic nepheline-syenite with its components largely idiomorphic. Tawaite is a coarse-grained mixture of sodalite and pyroxene.

Around the periphery of the nepheline syenite the rock is different from its main mass and it has produced contact effects with surrounding rocks. A nepheline syenite with a trachytic structure is described among the peripheral phases of the syenite, and a rock resembling pulaskite, but containing no porphyritic crystals. This rock, which the authors call umptekite, is a nepheline syenite, poor in nepheline. It differs from the nepheline syenite in containing a calcium-feldspar, from augite-syenite in possessing hornblende instead of augite, from laurvikite in its structure, and from akerite in its lack of quartz. Its structure is granitic. Arfvedsonite is its principal amphiboloid, and besides, it possesses aegerine. The characteristic minerals of the nepheline syenite are also present in it. The aegerine is frequently associated with sodalite or with feldspar in pegmatitic intergrowths. A sillimanite gneiss is mentioned as possibly being a metamorphized sediment.

The Matrix of Naxos Corundum.—The corundum[4] of Naxos occurs in an iron gray foliated or massive granular rock composed almost exclusively of corundum and magnetite. The first mentioned mineral is in largest quantity. Associated with these two components are limonitic and hematitic alteration forms of magnetite, margarite, tourmaline, muscovite, cyanite, staurolite, biotite, rutile and occasionally spinel, vesuvianite and pyrite. The corundum is in rounded grains or in well defined crystals surrounded by magnetite. Most of the other constituents, with the exception of the magnetite, appear to be the results of shearing. An analysis of the rock gave: Corundum

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[4] Tschermak, Min. u. Petrog. Mitth., xiv, p. 311.

=64.2% ; Magnetite=26.8% ; Iron oxides=6.9% ; Siliceous products =2.00%.

Miscellaneous.—In the abstract of a paper read before the Geological Society of America, E. B. Mathews[5] gives a brief account of several distinct types of granite, covering an area of 900 square miles, in the Pike's Peak district, Colo. All are believed to be portions of a single magma, erupted at different times, with the later portions cutting through the earlier ones.

Bayley[6] records the existence of a series of acid and basic tuffts, amygdaloids, glassy and crystalline lavas, and spherulitic phases of volcanic rocks on North and Vinal Haven, Maine.

Darton and Kemp,[7] in the same brochure describe a dyke near Dewitt centre, three miles east of Syracuse, N. Y. It is a peridotite similar to that described by Williams from Syracuse. Its composition is represented by the following figures:

SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO	MnO	Nio	CaO	BaO	SrO	Mgo	K_2O	Na_2O	P_2O_5	CO_2	SO_3	S	H_2O	Total	— O	= S
36.80	1.26	4.16	.20	8.33	.13	.09	8.63	.12	tr	25.98	2.48	.17	.47	2.95	.06	.95	7.44	=100.22	—.47	=99.75

Lepsius[8] divides gneisses into meta-gneisses—those formed by the metamorphism of sedimentary rocks, pro-gneisses—those constituting portions of the original earth crust, gneiss-granites—those produced from granite by fluidal movements of a liquid rock magma—and clasto-gneisses, those formed by the crushing of a solid granite.

Hornung[9] has examined a series of rocks associated with the melaphyres in the South Harz, and has shown that some of those that have been called clay slates are in reality volcanic tuffs. Their material was erupted in two different periods, and both were erupted before the melaphyre. The older tuff is composed essentially of a green basic pumiceous glass, the second of splinters of biotite, zircon, quartz, plagioclase, pyroxene and red garnet. Both have the typical tufaceous structure. The tuffs are interbedded with sediments, and their material is more or less thoroughly intermingled with the material of these latter rocks.

In the District of Columbia granitic rocks[10] have disintegrated into sandy soils, whose composition is almost identical with that of the compact rock from which they were derived.

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[5] Bull. Geol. Soc. Amer., Vol. 6, p. 471.

[6] Ib., p. 474.

[7] Ib., p. 477.

[8] Notizbl. des Ver. f. Erdk. iv Folge. 15 Hft., p. 1.

[9] Min. u. Petrog Mitth., xiv, p. 283.

[10] Merrill, Bull. Geol. Soc. Amer., Vol. 6, p. 321.

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	Na_2O	K_2O	P_2O_5	Ign	Total
Rock	69.33		14.33		3.60	3.21	2.44	2.70	2.67	.10	1.22	=99.60
Soil	65.69	.31	15.23	4.39		2.63	2.64	2.12	2.00	.05	4.70	=99.76

The disintegration processes are not chemical except in so far as hydration is chemical, but they are mainly mechanical.

Formation of Dolomite.—A most important contribution to the study of the formation of dolomite is made by M. C. Klement in the Bull. Soc. Belge Géol. Paléontol. et Hydrol. After describing the history of the theories of dolomite the author calls attention to the frequent occurrence of dolomite in the form of coral reefs, as observed by Dupont in the Devonian, by Richthofen and Mojsisovics in the Trias, and by Dana in the recent raised reefs of Metia in the Pacific. He points out that while in the chemical experiments that have been made with a view of dolomitizing carbonate of lime, *calcite* has always been operated on, the substance of coral has been shown by Sorby to be probably *aragonite.* The author has, therefore, carried out a large series of experiments on the action of the constituents of sea-water (particularly magnesium sulphate) upon aragonite, the results of which are given at full length. From these he finds (1) that a solution of magnesium sulphate, in the presence of sodium chloride, and at a temperature of 60° C. or more, decomposes aragonite with formation of a magnesium carbonate, the exact composition of which is difficult to determine, owing to the impossibility of isolating it from the residual aragonite; (2) that this action increases with the *rise of temperature,* and with the *concentration* of the solution, and is greatly diminished by the absence of sodium chloride; (3) that recent coral is attacked by magnesium sulphate just as mineral aragonite is; and (4) that the lagoons of modern coral reefs offered all the conditions of temperature, saturation, etc., necessary for the production of magnesium carbonate in the manner of experiments, while recognizing therefore, that dolomites may have been formed in more ways than one, M. Klement concludes that one of the most usual ways in nature has been the action of heated and concentrated sea-water in coral lagoons on the aragonite of coral and other skeletons, with formation of carbonate of magnesium, which is subsequently, perhaps after solidification of the rock, with the remaining carbonate of calcium, converted into massive dolomite. (Nature, June, 1895.)